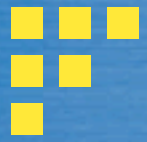




Types of Misconceptions

- Nature of science/evolutionary study
- Teaching about evolution
- Evolutionary terminology
- Evolutionary processes



Misconception: all scientific research is manipulative

Scientific research includes many strategies to understand our physical world.

Experimental or Naturalistic

Manipulative or Descriptive



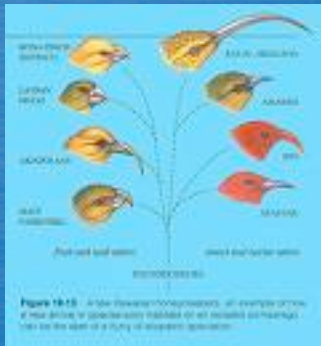
Misconception: evolution is “just a theory”

Scientific theory: an explanation of natural phenomena; supported by evidence through repeatable and testable methods over time by many researchers

Confusion with colloquial meaning of “theory”

- # 1. It is observable

- ## 2. We can make inferences from observations



<http://www.micro.utexas.edu/courses/levin/bio304/evolution/honeycreepers.gif>

Balgopal, 2011



<http://www.britannica.com>

Galapagos finches



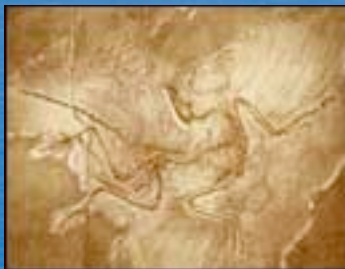
Misconception: Evolution is not observable, testable, or repeatable



Drosophila



Guppies



Archaeopteryx



Cichlids



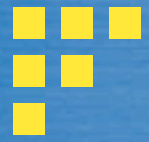
Elephant
seals

<http://evolution.berkeley.edu>



Soapberry Bugs

<http://www.carroll-loye.com/default.asp>



Misconception: teaching both "sides of the story" is legal

Teaching intelligent design and creation is illegal in public schools



1968 Banning the teaching of evolution in public schools is illegal (Epperson v Arkansas)

1987 LA federal judge ruled that the "balanced treatment" of science and religion is illegal (Edwards v Aguillard)

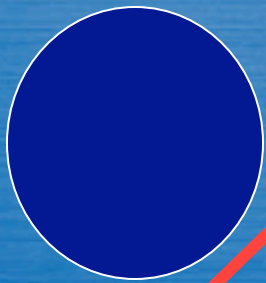
1997 LA federal judge ruled that disclaimers on textbooks was illegal (Freiler v Tangipahoa Parish Board of Education)

2005 Dover, PA federal judge ruled that I.D. does not meet the definition of science

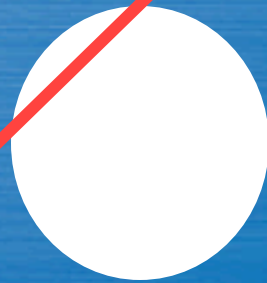


Misconception: teaching both "sides of the story" is fair

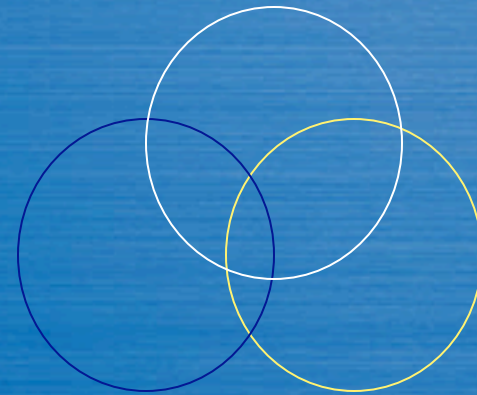
Giving students "choices" sets up science and religion in a false dichotomy



Science

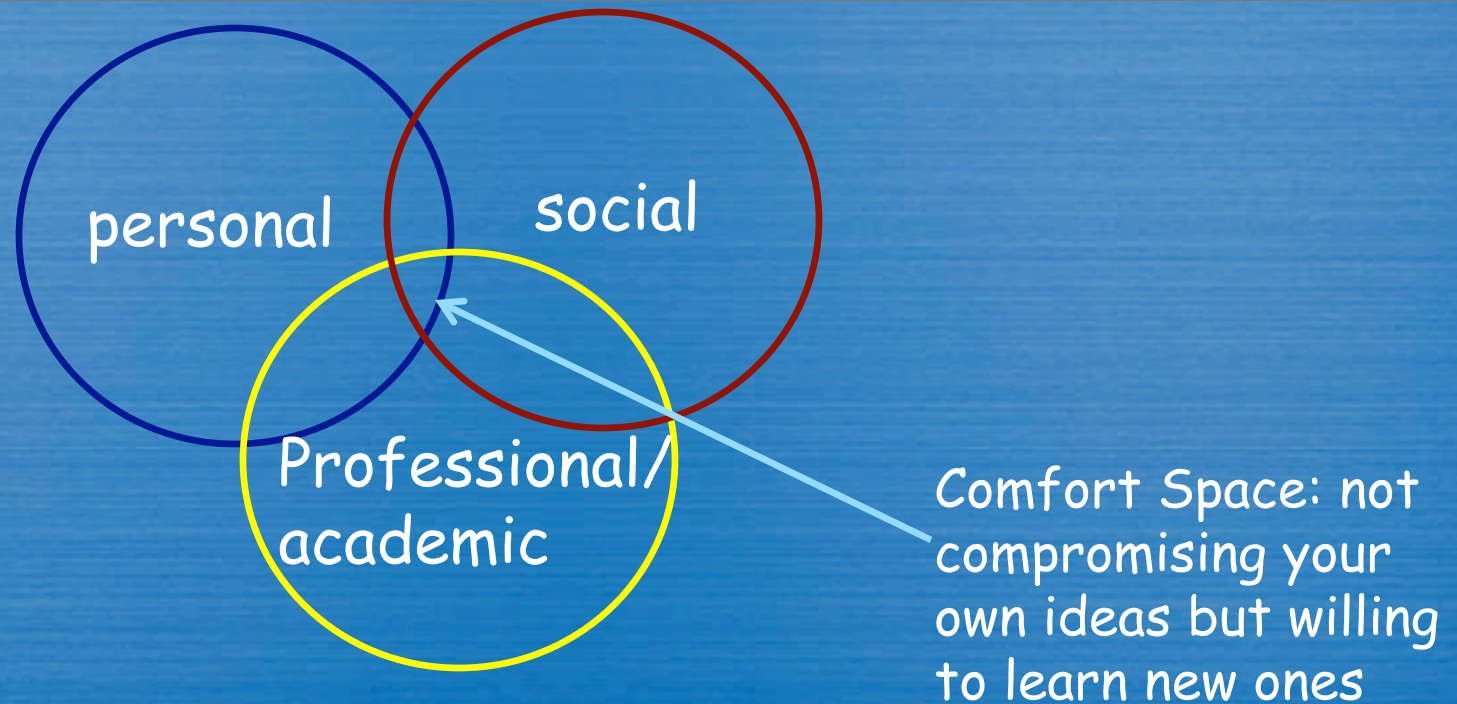


Religion



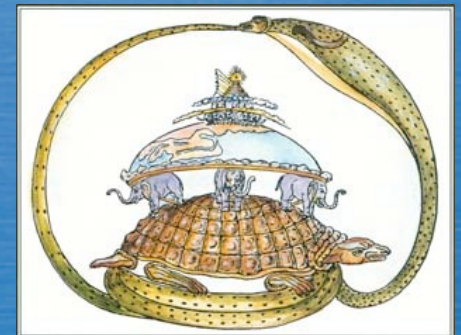
Many ways of knowing

■ ■ ■ Teachers must find their Comfort Space and recognize that they can help their students do the same



Misconception: teaching creationism and ID is okay in science class

There are many creation stories-



Which do you choose?

<http://www.bampfa.berkeley.edu/exhibits/indian/u0700.html>

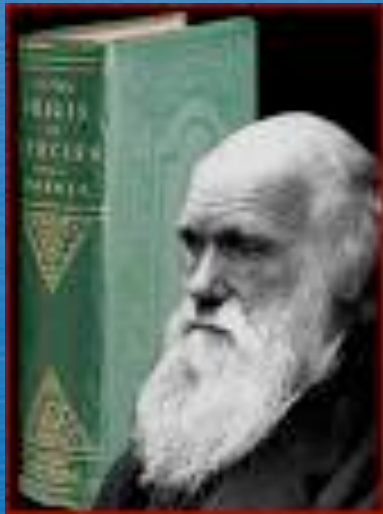
[http://www.mythencyclopedia.com/images/
mlw_0001_0002_0_img0101.jpg](http://www.mythencyclopedia.com/images/mlw_0001_0002_0_img0101.jpg)

[http://images.google.com/images?hl=en&lr=&client=safari&rls=en&q=Hindu
%20creation%20story
%20pictures&btnG=Search&ie=UTF-8&oe=UTF-8&sa=N&tab=wi](http://images.google.com/images?hl=en&lr=&client=safari&rls=en&q=Hindu%20creation%20story%20pictures&btnG=Search&ie=UTF-8&oe=UTF-8&sa=N&tab=wi)

Balgopal, 2011

Misconception: evolution explains the origin of life

Evolution **DOES** explain mechanisms for the origin of diversity of organisms on Earth



http://whyfiles.org/261evolution_qu/

On the Origin of Species

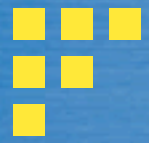


http://www.longitudebooks.com/images/book_large/NAT19.jpg



misconceptions: TERMS

	Unaccepted	Accepted
•Fitness:	Strength	Reproductive success
•Phenotype:	Physical traits only	Observable/ measurable
traits		
•Viable:	Fertile	Living
•Competition:	Fighting only	Race for resources
•Genetic drift:	Movement	Alleles present after random segregation (small populations)



misconceptions: PROCESSES

Unaccepted

Accepted

Adaptations are teleological

Changes do not occur due to NEED

Organisms direct their evol

Changes are not adaptations driven by desires

Survival of the fittest=NS

Differential survival and reproduction

Simple --> Complex

Evol is not progressive

Speciation=blending of species

Reproductive isolation (if you are using the biological species concept)



Misconception: Anthropomorphic explanations of adaptations

Organisms are not aware of their own evolution and are not choosing to adapt



Movies.yahoo.com





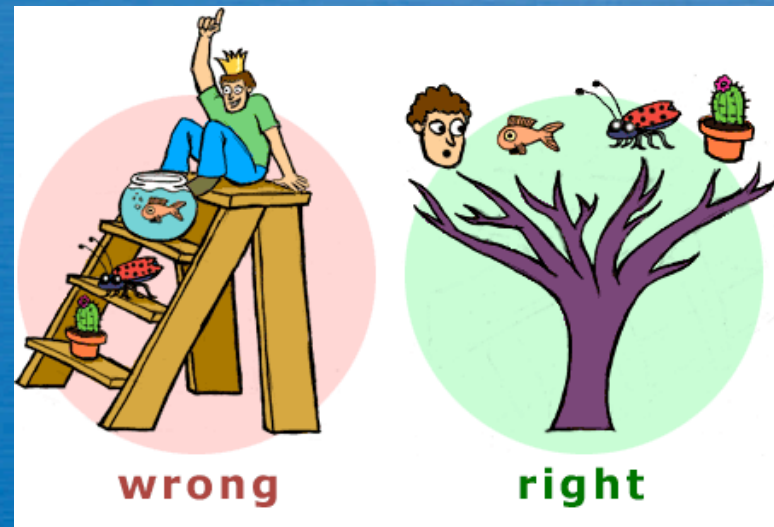
Misconception: "Disney Effect"

Settlage & Jensen

Organisms most closely related to humans are smarter and, therefore, can direct their evolution, unlike less intelligent organisms.



http://lnx.ginevra2000.it/Disney/bambi_2.htm





Misconception: Lamarckian adaptations

Students believe that the acquisition and loss of traits are due to either use or disuse during lifetime



Long
neck

<http://www.sacrs.org.za/ecm21/gallery/Gallery8.html>



Loss of
wings

<http://www.thesahara.net/ants.htm>



Misconception: natural selection is the only mechanism of evolution

Mechanisms of evolution include:

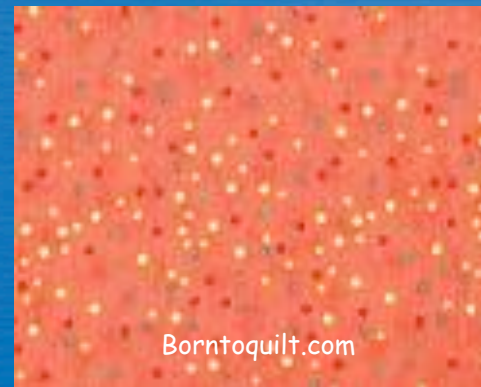
1. Natural selection
2. Genetic drift
3. Mutation
4. Gene flow



Misconception: Survival of the fittest

1. This is a circular statement
2. Often students believe that NS is driven only by predator avoidance and camouflage

Predator-prey
colored dot lab





Misconception: the environment induces changes

Natural selection implies that Someone or Something is **SELECTING**

Natural selection: Differential survival and reproduction



Summary

Evidence-based
Emotional space
Educate yourself
Engage students!